

editorials

Automatic Detection and Defibrillation of Lethal Arrhythmias—A New Concept

Patients fated to have sudden death from coronary artery disease have become the object of intense medical interest. The concept that death in most of these episodes is due to grave disturbances in cardiac electrical activity has resulted in the design and manufacture of an impressive armamentarium of in-hospital hardware to detect and to treat impending arrhythmias; many hospitals maintain physical areas in which such patients can be safely housed, with personnel specially trained to carry out the necessary maneuvers.

Whether such patients die or survive episodes of this type depends not only upon the availability of electrical defibrillators and upon the presence of trained personnel, but also upon the time elapsing between the onset of the arrhythmia and the beginning of treatment. It is estimated that nearly half the deaths from coronary disease are sudden and occur in subjects who never reach the hospital. In an attempt to bridge this serious gap, mobile units, instruction of ambulance crews, and general educational approaches designed to alert the population to seek hospitalization quickly have been experimented with. But it is unlikely that even vigorous efforts in this direction will do much to reduce the mortality among persons whose attacks occur in solitude, at home, in their place of work, or even in hospitals outside the immediate reach of a cardiac resuscitation team.

Identifying all subjects who are at high risk of dying suddenly from coronary artery disease is not currently possible. It is possible, however, to identify some of them, and it is reasonable to assume that our ability to recognize this selected group will improve over the years. Patients with recent onset of angina pectoris, or with angina of changing intensity, and those who have had acute myocardial infarction are particularly susceptible to lethal arrhythmias. Another group comprises patients with fixed-rate electronic pacemakers which have the potential of inducing ventricular fibrillation, unrelated to the fibrillation potential resulting from the underlying heart disease. For such selected patients Mirowski and his colleagues¹ in Baltimore

have now brought forth the concept of an automatic stand-by defibrillator, either external, for temporary in-hospital use, or implantable, for permanent protection in high-risk ambulatory cases. The Baltimore workers have demonstrated the biological and engineering feasibility of such a concept; a prototype unit has been developed which has the capability of reliably sensing lethal arrhythmias (ventricular fibrillation as well as other arrhythmias characterized by severe hemodynamic impairment) and delivering repeated shocks as necessary to establish normal rhythm.

The clinical validity and ultimate practicality of this idea remain to be tested. It is obvious that no amount of in-hospital sophistication can reduce the mortality of patients who die before reaching the hospital, or indeed before anyone else is aware of their catastrophic illness. While every effort is being made to learn how to prevent coronary artery disease, we must also continue to focus our attention on identifying the high-risk subject and on devising pharmacologic and mechanistic methods for preventing arrhythmic deaths.

1. Mirowski M, Mower MM, Staewen WS, et al: Standby Automatic Defibrillator: An Approach to prevention of sudden coronary death. *Arch Intern Med* 126:158-161, 1970.